REMARKS

Claims 17-35 are pending in the application after the Examiner's renumbering of the claims. Original claims 1-16 are shown herein as cancelled, as was intended in the preliminary amendment. Claims 19, 23, 24, 28, and 30-35 are cancelled by the present amendment. Claims 17, 18, 20-22, 25-27, and 29 are amended. Claims 36-40 are newly presented herein.

The Examiner requires a complete revision of the abstract. Claims are rejected under 35 USC 112 in overlapping groups in the respective paragraphs of the Office Action listed below:

13) Claims 17 and 31

14) Claims 18 and 32

15) Claims 19, 20, 33, and 34

16) Claims 19 and 33

17) Claims 20 and 34

19) Claim 28

Claims 17, 18, 20-26, and 28-30 are rejected under 35 USC 102(b) as being anticipated by Itoh et al. USPN 5,579,534. Claims 27, 31, 32, 34, and 35 are rejected under 35 USC 103(a) as being unpatentable over Itoh et al. USPN 5,579,534 in view of Khan EP 1 260 608 A1.

Response to requirement for a completely revised abstract

The abstract is replaced in the present amendment.

Response to 35 USC 112 rejections of claims

The claims have been extensively revised to correct all of the clarity issues noted by the Examiner. Care was taken not to add new matter.

Response to rejections under 35 USC 102(b)

The independent claims 17 and 36 now distinguish over Itoh by reciting substantially a single layer of MCrAlY particles greater than 80 micrometers in diameter applied to the intermediate layer, forming a studded bonding surface on the intermediate layer with at least

20% greater surface area than the outer surface of the substrate. These limitations are not found in Itoh. They are supported in Applicants' paragraphs [0016] and [0022], and are clarified in Applicants' drawing that shows a single layer of coarse particles (10) creating a studded surface (9). The drawing clearly shows a surface (8) of the intermediate layer (7) studded with a single layer of particles (10).

New dependent claims 38-40 further distinguish over Itoh in specific methods for creating the studded surface (9). Support for the method of claim 38 is found in [0017], for claim 39 in [0018], and for claim 40 in [0021].

Thus Itoh does not teach every feature of Applicants' invention as presently claimed, and therefore does not support a 35 USC 102 rejection of the amended claims.

Response to rejections under 35 USC 103(a)

The independent claims 17 and 36 herein clarify non-obvious distinctions of Applicants' invention over Itoh and Khan. Applicants' single layer of coarse particles (10) provides high surface roughness for bonding of the outer layer (16) without the usual disadvantage of voids between coarse particles. This is a new and non-obvious solution to problems of corrosion in the coarse layer and/or to operational cracking in the coarse layer propagating into the outer thermal barrier coating.

Applicants' coarse particles in a single-layer design allows use of application technologies for the coarse layer as in claims 26, 38, and 40 that would otherwise produce voids between course particles. See Itoh col. 1 lines 48-54, which describe an expected disadvantage of atmospheric plasma spraying in producing voids. Such voids however, could not occur in Applicants' single-layer design applied as illustrated. Applicants' specific range of grain size distributions in the intermediate layer (7) minimizes voids in that layer (makes it "dense" per paragraph [0018]).

Itoh and Khan also do not teach Applicants' application of a spray material (13) comprising a mean grain size of 22-62 micrometers in a layer 40 to 80 micrometers thick onto a particle-studded bonding surface (9) prior to applying a ceramic thermal barrier layer (16) thereto, as in claims 18 and 40. This additional layer (13) can be used to add further surface area to the particle-studded surface (9) without introducing voids that would occur between coarse

particles in multiple layers. The closest geometry of Khan to Applicants' additional layer (13) is shown in his FIG 3, using a fine layer (14) between two coarse layers (12 and 13). Not only does this not meet the specific geometry and grain distribution of Applicants' design, but it does not produce the void reduction of Applicants' single layer of coarse particles (10) followed by a relatively thin layer (13) of intermediate grain size. This is because Khan's coarse layer (14) is not limited to a single layer of coarse particles studded onto a dense intermediate layer.

Conclusion

The amendments herein have corrected the objections and 35 USC 112 rejections without adding new matter. The claims are clarified in aspects that distinguish Applicants' invention over the cited art. As argued above, Itoh lacks a coarse particle single-layer feature and other related features of Applicants' invention as claimed. Khan does not supply these missing features, which produce unexpected results as argued and supported above. Accordingly, Applicants respectfully request withdrawal of the rejections, and allowance of this application.

The Commissioner is hereby authorized to charge any appropriate fees due in connection with this paper or credit any overpayments to Deposit Account No. 19-2179.

Respectfully submitted,

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